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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,281	03/26/2004	Gerald Duane Larue	H0006214	2263

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Ephraim Starr, General Counsel, Turbo Division
Honeywell International Inc.
Suite #200
23326 Hawthorne Boulevard
Torrance, CA 90505

EXAMINER	
TRIEU, THAI BA	

ART UNIT	PAPER NUMBER
3748	

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/812,281	LARUE ET AL.	
	Examiner	Art Unit	
	Thai-Ba Trieu	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-15,20-23,26 and 27* is/are allowed.

6)☒ Claim(s) *16, 24, 25, and 28* is/are rejected.

7)☒ Claim(s) *17-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *06/14/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1-7 and13-23 are objected to because of the following informalities:

- In claim 1, lines 10-18 should be replaced by the following to maintain the consistency of the whole specification and claims:

-- a hydrodynamic foil bearing assembly mounted in the bore of the center housing rotatably supporting the shaft, and comprising a foil thrust bearing assembly, a first foil journal bearing located between the compressor wheel and the **foil** thrust bearing assembly, and a second foil journal bearing located between the **foil** thrust bearing assembly and the turbine wheel;

wherein the center housing defines a cooling air supply passage leading into the bore adjacent the **foil** thrust bearing assembly for supplying cooling air to the thrust bearing assembly, the **foil** journal bearings define cooling passages arranged to receive said cooling air after said cooling air has cooled the **foil** thrust bearing assembly, and the center housing defines cooling air discharge passages arranged to receive said cooling air after said cooling air has cooled the **foil** journal bearings. --

- Claim 2 should be replaced by the following:

-- The turbocharger of claim 1, wherein the first foil journal bearing

comprises an annular first bearing carrier formed separately from and fixedly mounted in the center housing, and the second foil journal bearing comprises an annular second bearing carrier formed separately from the center housing and first **annular** bearing carrier and fixedly mounted in the center housing, each **annular** bearing carrier mounting a foil along an inner surface of the **annular** bearing carrier. --

- Claims 3-7 and 13-23 should be followed the corrections as set forth above.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 28 is rejected under 35 U.S.C. 102(b) as being anticipated by Thomson et al. (Patent Number 5,014,518).

The method as claimed would be inherent during the normal use and operation of Thomson device as disclosed:

a turbocharger (54, 56, 58) having foil bearings (143, 147, 159) and having a turbine with a variable nozzle (103), wherein the variable nozzle is structured and arranged to receive exhaust gas from an engine (10) and supply the exhaust gas to a

turbine of the turbocharger, the method comprising partially closing the variable nozzle at engine idle condition so as to increase the idle speed of the turbocharger such that the foil bearings are prevented from stalling and stopping (See Figure 3, Column 4, lines 7-63, Column 5, lines 31-54, and Column 6, lines 45-68, and Column 7, lines 1-9).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) or 103 (c) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> (c) Subject matter developed by another person, which qualifies as prior art only under one or more subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schinnerer et al. (Patent Number 3,740,163), in view of Emerson et al. (Patent Number 5,529,464).

Schinnerer discloses a turbocharger comprising:

a compressor (36) comprising a compressor housing and a compressor wheel mounted in the compressor housing (Not Numbered) (see Figure 3);

a turbine (20) comprising a turbine housing and a turbine wheel mounted in the turbine housing (Not Numbered) (See Figure 3);

a shaft (Not Numbered) connecting the compressor wheel to the turbine wheel (see Figure 3);

a one-piece center housing (Not Numbered) disposed between and mounted to the compressor and turbine housings, the center housing defining a bore that receives the shaft therethrough (See Figure 3);

a bearing cartridge (26, 24, 28) mounted in the bore of the center housing rotatably supporting the shaft, the bearing cartridge (26, 24, 28) comprising a thrust bearing assembly 24) retained between first and second journal bearings (26, 28), the bearing cartridge (26, 24, 23) and center housing being configured such that the bearing cartridge is insertable as a unit into the bore of the center housing from an end of the center housing adjacent the compressor. (See Figure 3)

However, Schinnerer fails to disclose a bearing cartridge being a hydrodynamic foil bearing cartridge including a foil thrust bearing assembly and first and second foil journal bearings.

Emerson teaches that it is conventional in the turbopump art, to utilize a hydrodynamic foil bearing cartridge (88, 114, 34, 112A, 112B) including a foil thrust bearing assembly (88, 114, 34) and first and second foil journal bearings (112A, 112B) (See Figures 1-2, and Column 4, lines 1-18).

It would has been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized a hydrodynamic foil bearing cartridge including a foil thrust bearing assembly and first and second foil journal bearings, as taught by Emerson, to improve the efficiency and reliability of the Schinnerer device.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. (Patent Number 4,608,827), in view of Emerson et al. (Patent Number 5,529,464).

Hasegawa discloses a turbocharger (3) comprising:

a compressor (Not Numbered) comprising a compressor housing and a compressor wheel mounted in the compressor housing' (See Figures 1 and 4-6);

a turbine (Not Numbered) comprising a turbine housing and a turbine wheel (12) mounted in the turbine housing (See Figures 1 and 4-6);

a shaft (a component of shaft bearing portion 13) connecting the compressor wheel to the turbine wheel (See Figure 3);

a center housing (Not Numbered) disposed between and mounted to the compressor and turbine housings, the center housing defining a bore that receives the shaft therethrough (See Figure 3); and

a bearing assembly (13) mounted in the bore of the center housing rotatably supporting the shaft (See Figure 3);

wherein the center housing defines a water jacket (10) therein for circulating cooling water to cool the center housing and thereby cool the foil bearing assembly (See Figure 3, Column 3, lines 60-68, and Column 4, lines 1-18).

However Hasegawa fails to disclose a hydrodynamic foil bearing assembly.

Emerson teaches that it is conventional in the turbopump art, to utilize a hydrodynamic foil bearing assembly (88, 114, 34, 112A, 112B) (See Figures 1-2, and Column 4, lines 1-18).

It would has been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized a hydrodynamic foil bearing assembly, as taught by Emerson, to improve the efficiency and reliability of the Hasegawa device.

Claim 25 is rejected under 35 U.S.C. 103(c) as being unpatentable over Ghizawi (Patent Number 3,740,163), in view of Emerson et al. (Patent Number 5,529,464).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29,

1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Ghizawi discloses a turbocharger (10) comprising:

a compressor (14) comprising a compressor housing (Not Numbered) and a compressor wheel (Not Numbered) mounted in the compressor housing (See Figure 1);

a turbine (12) comprising a turbine housing (Not Numbered) and a turbine wheel mounted (Not Numbered) in the turbine housing (See Figure 1);

a shaft (16) connecting the compressor wheel to the turbine wheel (See Figure 1);

a center housing disposed between and mounted to the compressor and turbine housings (See Figure 4), the center housing defining a bore that receives the shaft therethrough (See Figure 4);

a bearing assembly (18) mounted in the bore of the center housing rotatably supporting the shaft (16), wherein the center housing defines a cooling air supply passage (via 52, 54) leading into the bore for supplying cooling air to the bearing assembly (18), and cooling air discharge passages arranged to receive said cooling air after said cooling air has cooled the bearing assembly (See Figure 1);

a cooling air supply line (52, 54) coupled to the cooling air supply passage of the center house (See Figure 1); and

a filter (24) arranged in the cooling air supply line for removing oil vapor from the cooling air before cooling air is supplied to cool the bearing assembly (18).

However, Ghizawi fails to disclose a bearing assembly being a hydrodynamic foil bearing assembly.

Emerson teaches that it is conventional in the turbopump art, to utilize a hydrodynamic foil bearing assembly (88, 114, 34, 112A, 112B) (See Figures 1-2, Column 4, lines 1-18);

It would has been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized hydrodynamic foil bearing assembly, as taught by Emerson, to improve the efficiency and reliability of the Ghizawi cooling system for a turbocharger.

Allowable Subject Matter

Claims 1-12, 13-15, 20-23, and 26-27 are allowed.

Claims 17-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: None of the cited prior art alone or in combination teaches the claimed combination of a

turbocharger having a hydrodynamic foil bearing assembly with a foil thrust bearing assembly and a pair of foil journal bearings including:

" **Regarding claim 1:**

the center housing defining a cooling air supply passage leading into the bore adjacent the foil thrust bearing assembly for supplying cooling air to the thrust bearing assembly, the foil journal bearings defining cooling passages arranged to receive said cooling air after said cooling air has cooled the thrust bearing assembly, and the center housing defining cooling air discharge passages arranged to receive said cooling air after said cooling air has cooled the journal bearings.

Regarding claim 13:

an undulating ring mounted about an outer surface of the annular bearing carrier, between the annular bearing carrier and an inner surface bore in the center housing, the undulating ring radially locating the foil journal bearing and providing thermal isolation between the annular bearing carrier and the center housing.

Regarding claim 20:

a foil journal bearing assembly comprising a pair of annular journal bearing carriers, the annular bearing carriers respectively disposed on opposite sides of the foil thrust bearing assembly with the annular bearing carriers being connected to each other so as to capture the thrust bearing assembly therebetween.

Regarding claim 26:

a reverse pitot tube connected to the cooling air supply for extracting cooling air from the engine air intake and delivering the cooling air into the cooling air supply line."

Conclusion

The IDS (PTO-1449) filed on June 14, 2004 has been considered. An initialized copy is attached hereto.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Agrawal (Pub. Number 2004/0066991 A1) discloses high load capacity foil thrust bearings.

- Wenger et al. (US Patent Number 6,439,209 B1) disclose gas dynamic pressure wave.

- Saville (US Patent Number 5,911,510) discloses bi-direction foil bearings.

- Doan (US Patent Number 5,140,968) discloses a closed loop breather system for engine crankcase.

- Bescoby et al. (US Patent Number 5,102,305) disclose a turbo-machine having a unitary ceramic rotating assembly.

- Katayama (US Patent Number 4,573,808) discloses a pneumatic journal bearing.

- Glaser (US Patent Number 4,167,295) discloses a magnetic thrust force relief for foil bearing turbomachine.

- Marley (US Patent Number 3,375,046) discloses a foil thrust bearing arrangement.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai-Ba Trieu whose telephone number is (571) 272-4867. The examiner can normally be reached on Monday - Thursday (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TTB
March 14, 2005

Thai-Ba Trieu
Primary Examiner
Art Unit 3748